

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AE) (Sem.-6th)
MEASUREMENT AND INSTRUMENTATION
Subject Code : AE-306
Paper ID : [A0721]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY.**
2. **Attempt any FOUR questions from SECTION-B.**
3. **Attempt any TWO questions from SECTION-C.**

SECTION-A**(10 × 2 = 20 Marks)**

1. Write short notes on :

- (a) Define Standard and Calibration.
- (b) What is selective radiation pyrometer?
- (c) For the given data calculate Mean and Standard deviation of the given data.
12,13,12,14,13,14,15,11,13,10,12,13,14,13,13,10,13,15,13.
- (d) Define Speed of Response, Fidelity, Dead time and Dead zone.
- (e) What is method of least square? Write down its significance.
- (f) If two resistances $R_1 = 500\Omega \pm 5\%$ and $R_2 = 4.7k\Omega \pm 4\%$ are in series combination, then what would be the probable error in the total resistance.
- (g) What is Magneto-strictive transducers? How they can be used in instrumentation?
- (h) Briefly explain the principle of photo conductive transducers.
- (i) Why Piezo-Electric transducer is called a dynamic transducer?
- (j) What is data acquisition system? Draw its basic building blocks.

SECTION-B**(4 × 5 = 20 Marks)**

2. Why we use Three lead or Four lead - RTD? Explain with help of a diagram and related mathematical equations.
3. What is Pyrometry? Explain the physical laws on which it is based upon. Elaborate the working of Optical pyrometer.
4. Drive the mathematical expression and draw the response of voltage across a capacitor in a RC circuit when a step input is applied to it. Hence from this define Time constant.
5. Prove that the differential arrangement of capacitive transducers increases the linearity, when the distance between the plates is used as mean of change in capacitance.
6. A PZT Crystal having thickness of 2mm and voltage sensitivity of 0.055Vm/N is subjected to a press of 1.5MN/m². Calculate the voltage output if the permittivity of quartz is 40.6×10^{-12} F/m. Also calculate charge sensitivity.

SECTION-C**(2 × 10 = 20 Marks)**

7. Write down the Principle, related mathematical equations, construction and working of Magnetic flow meter with the help of a neat diagram. Also write its merits & demerits. Compare this flow meter with other flow meters.
8. What is thermocouple? Explain its construction and working principle.

The cold junction of a thermocouple is connected to a potentiometer terminal having a temperature of 24°C. The potentiometer reads 25.76 mV. What is the temperature of the Hot junction ? The calibration chart of the Thermocouple is

Temp. °C	20	24	28	420	440	460
Voltage mV	0.8	0.95	1.12	26.25	26.72	26.84

9. Write down the Principle, related mathematical equations, construction and working of Strain gauge with the help of a diagram. Also mention its various types, compensation methods and applications.